

905,101.

F. A. READ.  
 BUTTONHOLE FINISHING MACHINE.  
 APPLICATION FILED JUNE 25, 1908.

Patented Nov. 24, 1908.  
 3 SHEETS—SHEET 2.

Fig. 3.

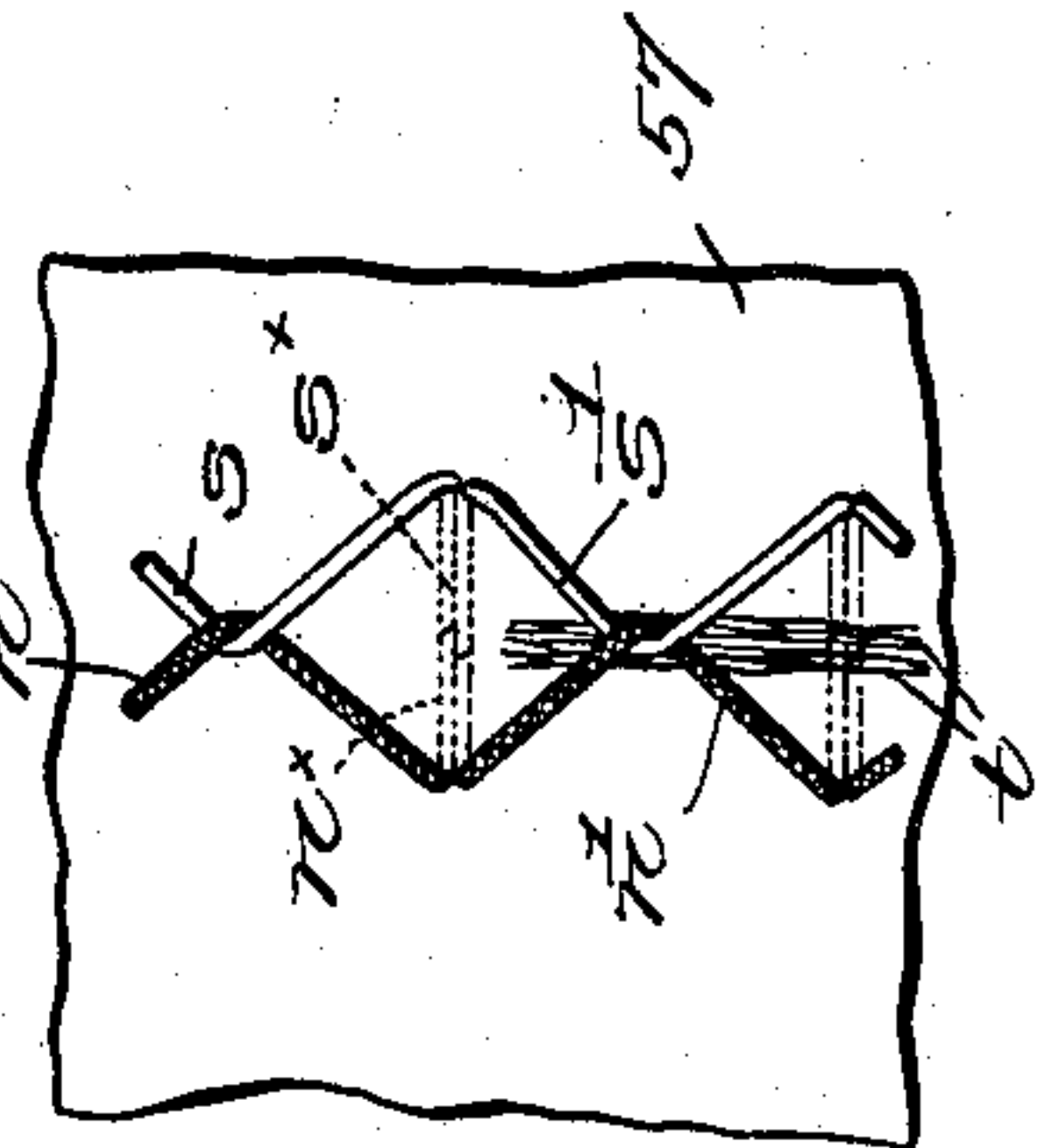
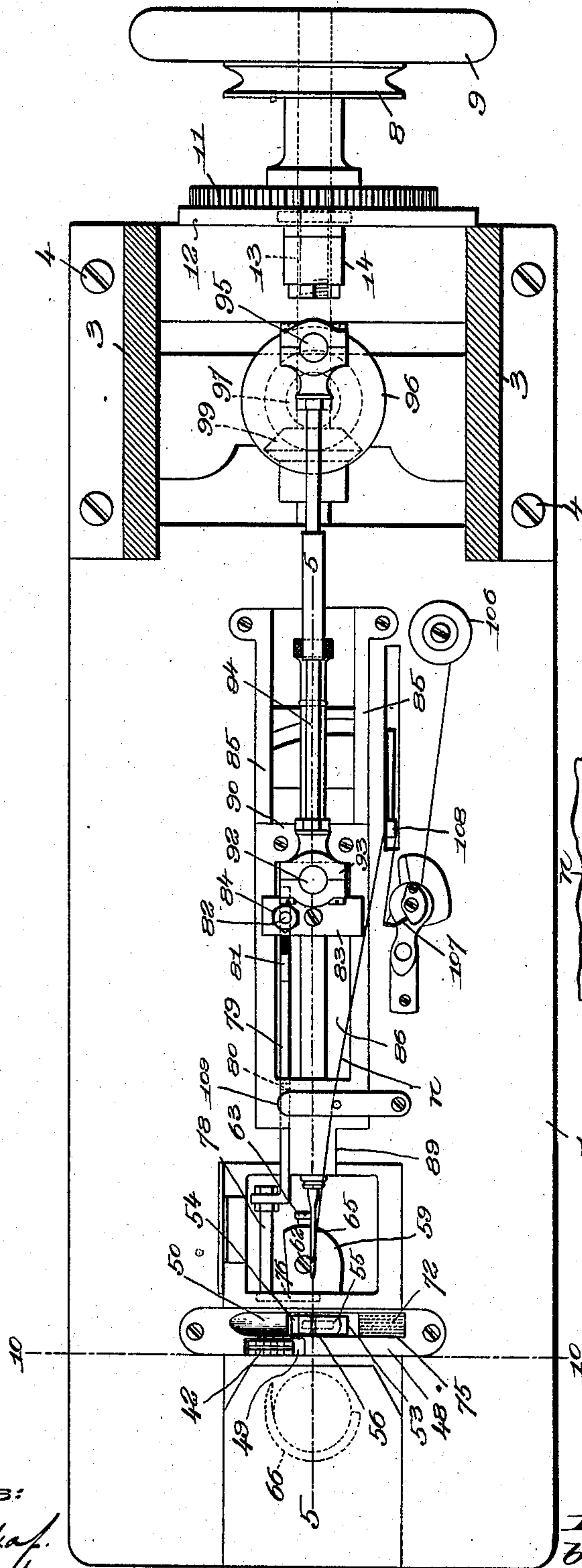


Fig. 4.

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*Fig. 1.*

*Fig. 2.*

*Fig. 3.*

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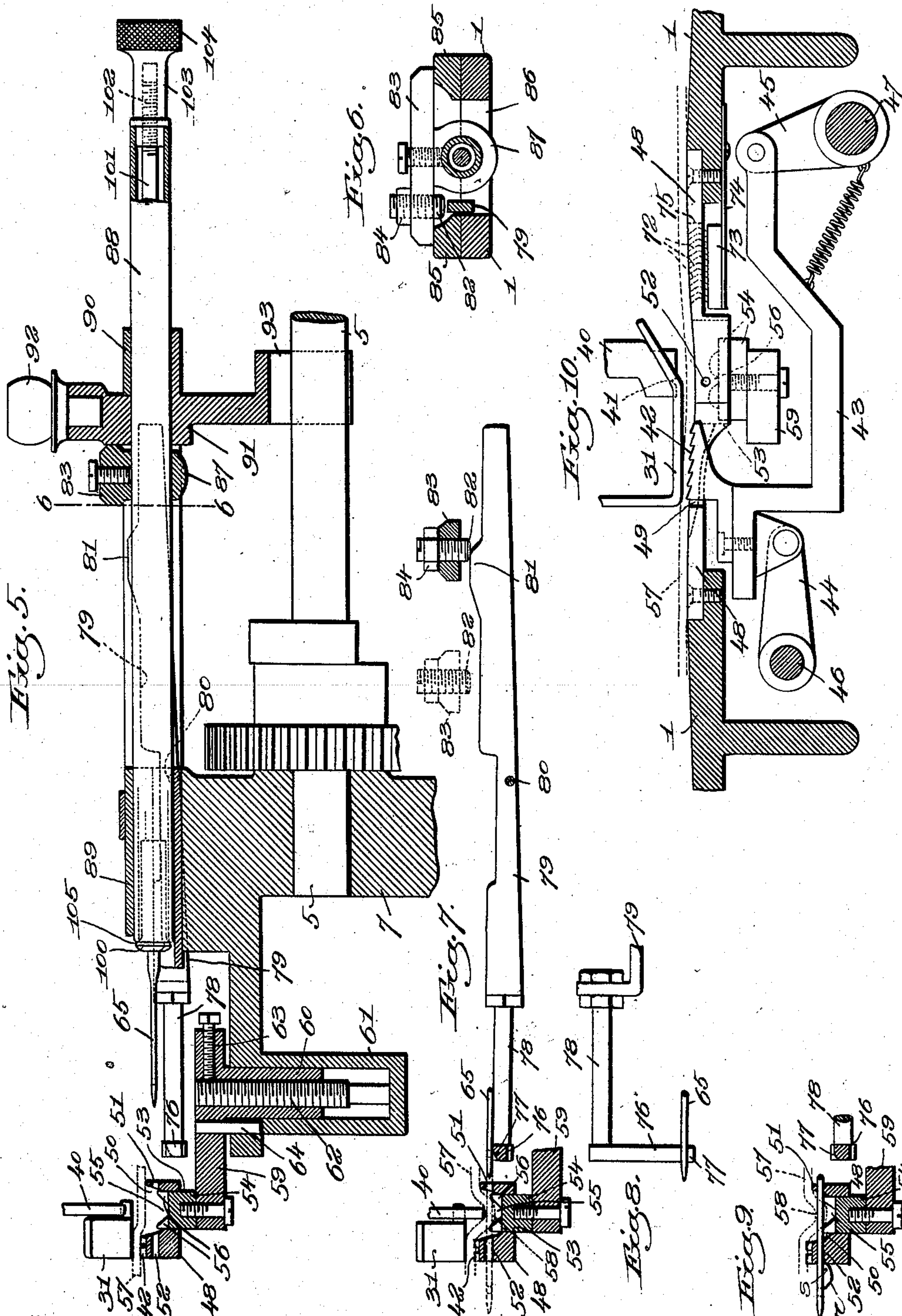
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# UNITED STATES PATENT OFFICE.

FRED A. READ, OF LYNN, MASSACHUSETTS, ASSIGNOR TO THE REECE BUTTON HOLE MACHINE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

## BUTTONHOLE-FINISHING MACHINE.

No. 905,101.

Specification of Letters Patent.

Patented Nov. 24, 1908.

Application filed June 25, 1908. Serial No. 440,206.

*To all whom it may concern:*

Be it known that I, FRED A. READ, a citizen of the United States, and resident of Lynn, county of Essex, State of Massachusetts, have invented an Improvement in Buttonhole-Finishing Machines, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention has for its object the production of a novel sewing machine of the class wherein the work to be stitched is bent before it is penetrated by the needle so that the latter may enter and its point emerge from the same side of the work to produce a blind stitch.

In my present invention, which is particularly adapted for finishing button-hole pieces for boots and shoes, I have provided novel means for bending the work, and said means is also made readily adjustable to vary the depth or extent of the bending, the adjustment being conveniently and quickly made by the operator. I have also provided means whereby the needle-guide is moved into its operative or guiding position in such manner that it does not interfere with the needle-thread, thereby obviating any tendency to fray or break the thread or obstruct the proper action of the loop thereof.

These and other novel features of my invention will be fully described in the subjoined specification and particularly pointed out in the following claims.

Figure 1 is a front elevation of a sewing-machine of the class referred to, embodying one form of my present invention; Fig. 2 is a sectional detail showing the bender-actuating cam, on the line 2—2, Fig. 1, looking toward the left; Fig. 3 is a top plan view of the parts of the machine below the line 3—3, Fig. 1, showing the relative location of some of the operating parts and their construction; Fig. 4 is an enlarged detail showing the stitch formed, viewed from the under side of the work; Fig. 5 is an enlarged sectional detail on the line 5—5, Fig. 3, the needle, and the reciprocating needle-bar or carrier being shown for the most part in elevation; Fig. 6 is a cross-sectional detail on the line 6—6, Fig. 5, looking to the right, showing the cross-head and its guides; Fig.

7 is a detail in section of the means for producing the bend in the work, the needle-guide, and the controlling cam for said guide, the latter being shown in elevation; Fig. 8 is a top plan view of the needle and its guide in the position illustrated in Fig. 7; Fig. 9 shows the lower one of the bending members, in section, and the needle in position for its loop of thread to be entered by the point of the shuttle carrying the complementary thread for forming the stitch; Fig. 10 is an enlarged cross-section on the line 10—10, Fig. 2, looking toward the right, showing the feed-bar and a portion of its actuating mechanism, and the device for collecting the thrums; Fig. 11 is a cross-sectional detail on the line 11—11, Fig. 1, taken through a portion of the oscillating bender arm, and looking toward the left.

In the machine to be hereinafter described I have so constructed and arranged the mechanism that the needle which forms a part of the stitch-forming mechanism is reciprocated transversely to a bending groove adjustably mounted below the work, and said needle also moves in a path at right-angles to the feed of the work, so that no lateral motion of the needle is necessary to enable it to coöperate properly with the work. This simplifies construction and gives a very direct and positive operation.

The feeding mechanism for the work is of the usual four-motion type, and I have shown only so much of the same as will be necessary for a clear understanding of the same in relation to other parts of the mechanism.

Referring to the drawings, Figs. 1 and 2, the bed-plate 1 of suitable shape and size to sustain the operating parts of the machine, has erected upon it an overhanging arm 2 which is branched or bifurcated at its base at 3, and secured to the bed-plate by suitable screws 4.

The main or driving shaft 5 extended beneath the bed-plate and supported in bearings 6, 7 is provided with a suitable belt-pulley 8 and hand or fly-wheel 9 and a pinion 10, the latter meshing with a large gear 11 having an attached edge cam 12, shown in side elevation Fig. 2, the gear and cam being fixedly mounted on a stub-shaft 13 rotatably mounted in a post bearing 14 on the



bed-plate between the branches 3 of the base of the overhanging arm. This cam is the bender actuator, and coöperates with a follower roll 15, Fig. 1, on the outer end of a vibrator 16 fulcrumed at 17 on the arm 2, said vibrator having mounted upon it a bar with an elongated cam face 18, said cam-bar preferably being made of hardened steel and suitably attached to the vibrator.

10 An oscillating arm 19 fulcrumed at 20 on the overhanging arm 2 has its right hand end extended at 21 above the vibrator 16, see Fig. 1, and is slotted longitudinally at 22, Fig. 11, upturned ears 23 on the extension rotatably supporting a rod screw-threaded at 24 between said ears and adapted to pass through the upper end of a depending follower 25 extended through the slot 22 and adapted to engage the cam face 18.

20 The follower is shouldered to bear against the bottom of the extension 21 and is reduced in width to form a relatively narrow cam-engaging portion 26.

By turning the threaded rod 24 the follower is moved toward or from the fulcrum 17 of the vibrator and hence along the cam face 18, to thereby vary the stroke imparted to the oscillating arm 19, such adjustment acting to vary the operation of the reciprocating member of the bending means, as will be described.

In practice the upper end of the follower is slitted, as shown in Fig. 11, and the threaded adjusting rod 24 passes through a threaded hole in such part, a suitable clamp-screw 27 serving to draw the sides together and thereby tightly clamp the follower in adjusted position on the rod 24.

A spring 28 connects the vibrator 16 and the adjacent end of the oscillating arm 19, keeping the follower foot 26 in constant engagement with the cam 18, while a spring 29 connected with the arm 19 and with the base 3 holds the roll 15 in engagement with the bender actuating cam 12, as will be manifest.

The free end of the overhanging arm 2 is shaped to provide bearings for the usual bar 30 of a presser-foot 31, Figs. 1 and 10, and for a vertically reciprocated bender-carrier 32, having attached to it between the bearings two collars 33, 34, the former having a laterally extended lug or stud 35 which loosely enters a notch 36 in the adjacent end of the oscillating arm 19. The said arm below the notch bears upon an annular flange 37 on a hub 38 loosely embracing the bender-carrier 32, said hub being normally held against the collar 33 by a strong spring 39 coiled around the carrier between the lower end of said hub and the fast collar 34. The bender-carrier is lifted by coöperation of the stud 35 with the notch 36 when the outer end of arm 19 is elevated, and when de-

pressed the free end of said arm bears upon the flange 37 and depresses the carrier, the spring 39 permitting any necessary yielding of the parts but being strong enough to effect downward movement of the carrier in unison with the acting end of the arm 19 under ordinary working conditions.

It will be apparent that the spring 29 is the active agent for effecting the elevation of the bender-carrier. At its lower end the latter has attached to it the reciprocating member of the bending means, viz:—the bender proper, made as a flat, depending and relatively thin bar 40, offset to clear the presser-foot, as shown in Fig. 1, the substantially horizontal lower edge of the bender being shown in Fig. 10 as having a notch 41 therein to prevent any accidental engagement with the needle.

The bender in practice reciprocates in a vertical plane parallel to the line of feed of the work and is located at one side of and slightly in advance of the usual serrated or toothed feed-bar 42 mounted on a carrier 43 below the bed-plate 1 and supported and actuated by links 44, 45, Fig. 10 on the oscillating shafts 46, 47 of the usual four-motion feed mechanism and of itself forming no part of my invention.

A throat plate 48 is let into a suitable recess in the bed-plate 1 and is cut away at 49, Figs. 3 and 10, for the feed-bar 42, the throat-plate being provided with a deep longitudinal groove 50 parallel to the feed and having registering needle passages 51, 52, Figs. 5, 7 and 9, a hole 53 in the bottom of the groove 50 receiving therein a vertically adjustable block 54 having a longitudinal groove 55 in its upper face and an intersecting transverse slot 56 between the needle passages. This block is the complementary member of the bending means and co-operates with the reciprocating member or bender 40 to form the bend in the work preparatory to the entrance of the needle into the bent portion of the work, which is indicated by dotted lines at 57, Figs. 5, 7 and 9.

The work is fed over the grooved throat-plate 48 and at each descent of the bender 40 it depresses the portion of the work beneath it into the longitudinal grooves 50 and 55 of the throat-plate 48 and block 54 respectively, forming the bend 58, Figs. 7 and 9, the bend being located between the needle passages 51, 52, so that as the needle moves forward it will penetrate the work, at the bend, and emerge therefrom at the same side, the transverse slot 56 providing a clearance for the needle in such movement.

The bender block 54 is mounted on the overhanging head 59 of a shank 60, Fig. 5, which enters a socketed support 61 shown as forming a part of the bearing 7 beneath the



bed-plate, and a vertical adjusting screw 62 passes through a threaded hole in the shank and rests on the bottom of support 61. By turning the screw 62 in one or the other direction the bender block is raised or lowered, to decrease or increase, respectively, the depth of the bend to be formed in the work, the stroke of the bender 40 being adjusted correspondingly by the means hereinbefore described. A set-screw 63 in the head 59 is set up against the screw 62 when the adjustment is made, to prevent any accidental disarrangement, and a pin 64 depending from the head into a hole in the support 61 prevents any rotative movement of the head and shank relatively to said support when the adjusting screw is manipulated. The clearance for the needle provided by the slot 56 in the grooved bender block enables the latter to be adjusted for a very shallow bend, as will be manifest, the deeper the bend to be made the lower down will the block be moved.

The eye-pointed needle 65 is reciprocated in a horizontal path at right angles to the line of feed, by means to be described, and when the needle enters the work it carries therewith the loop of needle-thread  $n$ , and as the loop is carried beyond the outer end of the passage 52 and opened it is entered by the shuttle-thread  $s$ , indicated in Fig. 9, the shuttle 66, see dotted lines Figs. 1 and 2 being of any suitable or usual construction and rotated by the gears 67, 68, counter-shaft 69 and gears 70, 71 the latter on the main shaft 5.

Referring to Fig. 4 the loop  $n^*$  of needle-thread is interlocked with the loop  $s^*$  of shuttle-thread and is drawn within the work as the needle is retracted, as shown in dotted lines, and the bender 40 rises, remaining up on the next forward stroke of the needle so that the latter does not penetrate, but passes under the work, and the interlocking of the loops  $n'$  and  $s'$  of needle and shuttle thread will be outside the work, as shown in Fig. 4, the next interlocking being again within the work, as it is bent by the bending means.

In finishing button-hole pieces the "thrums" on the under side of the work will be crossed by the external interlocked loops  $n'$ ,  $s'$  and will thereby be secured neatly and firmly in place, such thrums being indicated at  $t$ , Fig. 4.

Herein I have shown the thrum-gatherer as composed of a series of upturned bent wire teeth 72 mounted on a leather or other pad 73 carried by a light spring-finger 74, Fig. 10, attached to the under side of the bed-plate, the points of the teeth projecting through a hole 75 in the throat-plate in front of the bending point, see Fig. 10.

As the work is fed forward the thrum ends are engaged and collected by the teeth

72 and brought close together, with a combining action, so that they will be crossed by the external inter-locking loops of thread and held in place, as explained. In blind-stitch machines of this general type the needle is acted upon near its point by a guide as it is about to enter the work, to prevent deflection of the needle from its proper path, and herein I have provided such a guide, but I operate it in such manner that it is not brought into engagement with the needle until the eye has passed beyond the guide.

It will be evident that as the needle is withdrawn from the work the needle-thread extends from the work to the bottom side of the needle, up through the eye and thence to the usual take-up and tension devices, and when the guide engages the needle in advance of the eye, as heretofore has been the practice, the lower portion of the thread is often cut or so weakened by abrasion on the guide that it will break when the loop is drawn taut. This action I obviate in my present invention, as will be clear from the following description. The needle-guide 76 extends at right angles to the needle-path and is preferably convexed or beveled at 77 at the part which engages the needle, to reduce friction, the guide being mounted on a shank 78 parallel to the needle path and rigidly attached to an elongated rocking support or carrier 79, fulcrumed at 80, the upper edge of the carrier having a cam 81 formed upon it, Figs. 2, 5 and 7. When the carrier is rocked the needle-guide will be raised or lowered, and this movement is effected by the coöperation of a follower 82 with the cam 81, said follower being shown as an adjustable screw-stud held in and depending below a cross-head 83 and maintained in vertically adjusted position by check-nut 84.

The extreme right hand position of the cross-head and follower is shown in Figs. 3 and 5, and in Fig. 7 the follower is just engaging the high part of the cam 81, thereby lifting the needle-guide into operative position, as shown, but it will be seen that the engagement of the part 77 of the guide with the needle is back of the eye, so that the thread cannot be interfered with. As the cross-head is moved to the left by means to be described, the follower will pass off the cam, as shown by dotted lines Fig. 7, and then the guide will descend into inoperative position, Fig. 9, and also shown in Fig. 5. On the return stroke of the cross-head, the follower will again coöperate with the cam to first elevate and then permit the depression of the needle-guide, but this action is of no particular moment so far as concerns the guidance of the needle, as the latter is then moving away from the work. The cross-head slides on guides formed by the parallel



sides 85 of an open frame attached to the bed plate of the machine, the latter being longitudinally cut away at 86, said cross-head having rigidly secured to its under side a collar 87 in which is clamped a tubular needle-carrier 88. The left hand end of the open frame is shaped to form an elongated sleeve-like guide 89 shown in Figs. 3 and 5, through which the needle-carrier slides as it is reciprocated, the frame sides 85 being connected about midway of their length by a bridge 90, through which bridge the needle carrier also reciprocates. The bridge and the bearing 89 thus form fixed tubular supports in which the needle carrier is firmly yet slidably sustained. A collar 91 fixedly secured to the needle carrier between its supports carries an upturned stud having a preferably rounded head 92, and the collar has a depending, bifurcated extension 93 which straddles the main shaft 5, thereby preventing any rotative movement of the needle-carrier as the latter is reciprocated.

The head 92 of the stud is embraced by the usual strap box 93 of a link 94 pivotally connected at its other end with a wrist pin 95 carried by a disk 96, see Figs. 1 and 2, fast on the upper end of a short shaft 97 extended through the bed plate and having on its lower end a beveled gear 98 in mesh with a similar gear 99 on the driven shaft 5. As the disk 96 is rotated, the connecting link 94 acts to reciprocate the cross-head 83 to thereby reciprocate the needle-carrier in a path at right angles to the line of feed of the work. The tubular needle-carrier 88 has mounted in its forward end a split chuck 100 into which the shank of the needle 65 is inserted, the chuck itself being mounted on a rod 101 extended through the needle-carrier and threaded at its rear end at 102 to receive thereon a controlling nut 103 having a milled or other head 104. By setting up this nut the rod 101 tends to draw the chuck 100 into the needle-carrier, the beveled edge 105 of the chuck being acted upon at such time by the adjacent end of the needle-carrier to compress the chuck tightly upon the needle shank to hold the latter rigidly in position. To release the needle all that is necessary is to loosen the nut 103, whereupon the chuck opens, and the needle can be removed or inserted as may be desired.

The intermediate mechanism between the main shaft and the tubular needle-carrier or bar 88 is so timed with relation to the operation of the mechanism which reciprocates the bender 40 that the needle makes two operative strokes for every operative or descending stroke of the bender, whereby on one stroke the needle penetrates and passes through the bend made in the work by the bending means, and on the next stroke the needle passes underneath the work

to effect on such latter stroke the interlocking of the needle and shuttle threads outside of the work and across the collected thrums.

The adjustment of the bending means is effected easily and in a convenient manner by the devices hereinbefore described, all of which are readily accessible to the operator, and the clamping or unclamping of the needle in the needle-bar or carrier 88 is also effected quickly and easily.

Any adjustment of the movement of the needle-guide is provided by adjusting the follower 82 up or down with relation to the cross-head to thereby vary the throw of the guide relatively to the needle path. The movement of the needle guide, governed as it is from the cross-head which reciprocates in unison with the needle, must in consequence always be properly timed with relation to the movement of the needle.

The needle thread led from a suitable spool not shown is controlled by a tension device 106 on the bedplate, the thread passing thence around a spring finger 107 to the take-up arm 108, and being led from the latter underneath a guide 109 to the needle, but the devices for controlling the tension and for effecting the take-up of the needle thread form no part of my present invention, and may be of any suitable or usual construction.

My invention is not restricted to the precise construction and arrangement herein shown and described, as the same may be modified or rearranged in different particulars by those skilled in the art without departing from the spirit and scope of my invention, substantially as set forth in the subjoined claims.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a sewing-machine, means to form bends in the work, stitch-forming mechanism, including a horizontally-reciprocating eye-pointed needle to penetrate the bends formed in the work on each alternate forward stroke, a needle-guide, and means to move it into operative engagement with the needle after its eye has moved forward beyond the guide.

2. In a sewing-machine, stitch-forming mechanism, including a reciprocating eye-pointed needle adapted to penetrate and pass under the work on alternate forward strokes, a movable needle-guide, and means to effect its coöperation with the needle only after the eye thereof has advanced beyond the guide.

3. In a sewing-machine, stitch-forming mechanism, including an eye-pointed needle, means to reciprocate it, a needle-guide, and means governed by the needle-reciprocating means to move the guide into coöperation



with said needle after its eye has advanced beyond the guide.

4. In a sewing-machine, means to intermittently form bends in the work, stitch-forming mechanism, including an eye-pointed needle, a needle-bar on which it is mounted, fixed bearings for said needle-bar, and means to reciprocate the latter at right angles to the bends formed in the work and to thrust the needle thereinto, combined with a movable needle-guide, and means controlled by movement of the needle-bar to bring the guide into coöperation with the needle after the eye thereof has advanced beyond the guide.

5. In a sewing-machine, stitch-forming mechanism, including an eye-pointed needle, a horizontally reciprocating needle-bar therefor, and fixed bearings for the needle-bar, means to act upon the work on each alternate forward stroke of the needle and cause the latter to penetrate the work, and a needle-guide governed by the needle-bar and moved automatically into coöperation with the needle only after its eye has advanced beyond the guide.

6. In a sewing-machine, stitch-forming mechanism, including an eye-pointed needle, a horizontally reciprocating needle-bar therefor, and fixed bearings for the needle-bar, combined with means to form bends in the work on alternate forward strokes of the needle and at right angles to its path, a needle-guide, and means controlled by movement of the needle-bar to effect intermittent coöperation of the needle-guide and the needle.

7. In a sewing-machine, stitch-forming mechanism, including an eye-pointed needle, a horizontally reciprocating needle-bar therefor, and fixed bearings for the needle-bar, combined with means to form bends in the work on alternate strokes of the needle and at right angles to its path, a needle-guide, and means, including a cam, and an adjustable coöperating follower movable in unison with the needle-bar, to cause the guide to engage the needle after the eye thereof has advanced past the guide.

8. In a sewing machine, stitch-forming mechanism, including an eye-pointed needle, a tubular needle-bar provided at one end with a chuck to hold the needle, and a chuck-controller manually operated from the opposite end of the needle-bar, fixed bearings for the latter, and means to reciprocate the needle-bar, feeding mechanism acting at right angles to the needle-path, and means to form bends in the work on alternate forward strokes of the needle.

9. In a blind-stitch sewing machine, a stationary bender member having a groove, a vertically movable bender member to intermittently bend the work into said groove, an

oscillating arm operatively connected with and to reciprocate said movable member, a vibrator having a constant stroke, and an adjustable connection between the vibrator and the arm to vary the amplitude of oscillation thereof and thereby vary the effective stroke of the movable bender member.

10. The combination, with stitch-forming mechanism, including an eye-pointed needle reciprocated in a fixed path, of a vertically adjustable and normally stationary block having a groove at right angles to the needle-path and transversely slotted for the passage of the needle, a vertically movable bender to intermittently engage and bend the work into the groove, to be entered by the needle, means, including a vibrator having a constant stroke, to effect reciprocation of the bender, and a manually adjustable device intermediate the vibrator and bender to vary the effective stroke of the bender.

11. The combination, with stitch-forming mechanism, including an eye-pointed needle reciprocated in a fixed path, of a vertically adjustable block having a groove at right angles to the needle-path and transversely slotted for the passage of the needle, a vertically movable bender to intermittently engage and bend the work into the groove, to be entered by the needle, an oscillating arm operatively connected with the bender, a vibrator having a constant stroke and provided with a cam, and a follower adjustably mounted on the arm and coöperating with the cam, adjustment of the follower varying the effective stroke of the bender.

12. In a sewing-machine, stitch-forming mechanism, including a horizontally-reciprocated eye-pointed needle and means for reciprocating it in a fixed path, a throat-plate grooved at right angles to the needle-path and having aligned needle passages at opposite sides of the groove, a block vertically adjustable within the groove and transversely slotted for the passage across it of the needle, a vertically movable bender to intermittently engage and bend the work into the grooves in the throat-plate and block, to be penetrated by the needle, means to depress the bender on alternate forward strokes of the needle, whereby the latter penetrates the work only on such strokes, and means to adjust the effective stroke of the bender to thereby vary the depth of the bends.

13. In a sewing-machine, stitch-forming mechanism, including a horizontally-reciprocated eye-pointed needle and means for reciprocating it in a fixed path, a throat-plate having an opening therein, a vertically adjustable block in such opening having a groove at right angles to the needle-path and transversely slotted for the passage of the needle, a vertically reciprocating bender



to bend the work into the groove, to be penetrated by the needle, devices to adjust the stroke of the bender, means to effect its active strokes on alternate forward strokes of the needle, whereby the latter penetrates and passes under the work on alternate strokes, a thrum-gatherer on the throat-plate, comprising a series of flexible teeth to engage and collect the thrums, as the work is fed,

and feeding mechanism acting at right 10 angles to the needle-path.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

FRED A. READ.

Witnesses:

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THOMAS J. CARTY.